

PATENT ABSTRACTS OF JAPAN

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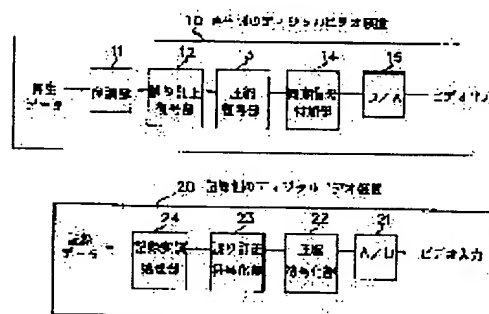
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(54) DIGITAL VIDEO DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide the digital video device capable of restricting the number of times of a copy on account of deterioration of a picture whenever it is copied like an analog video device.

SOLUTION: A noise information generating part is provided either or both of a compression decoding part 13 on the reproducing side and a compression coding part 22 on the recording side, and noise information which cannot be discriminated by processing a digital video data only one time at the time of reproducing a picture is buried in the noise information generating part. Consequently, although copying itself is feasible, the picture is remarkably deteriorated by repeating its copy plural times, thus substantially restricting the number of copying times.



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CLAIMS

[Claim(s)]

- [Claim 1] Digital video equipment characterized by establishing the means which embeds the noise information on the grade which is not discriminable by one processing from a record medium in the digital video data read from the record medium in the digital video equipment which reproduces a digital video data at the time of an image reconstruction.
- [Claim 2] Digital video equipment characterized by establishing the means which embeds the noise information on the grade which is not discriminable in one processing at the time of an image reconstruction into the digital video data which writes a digital video data in a record medium in the digital video equipment recorded on a record medium.
- [Claim 3] In the digital video equipment which reproduces a digital video data from a record medium while a digital video data is recorded on a record medium The noise information on the grade which is not discriminable by one processing at the time of an image reconstruction in the digital video data written in the means or record medium which embeds the noise information on the grade which is not discriminable in one processing at the time of an image reconstruction into the digital video data read from the record medium Digital video equipment characterized by establishing both both [any, one side, or] to embed.
- [Claim 4] Digital video equipment which elongates and carries out reverse orthogonal transformation of the digital video data, and is characterized by preparing the noise information occurrence section in the compression decode section, and superimposing a noise information in the digital video equipment equipped with the compression decode section understood further a blocked part at the time of the decode of a digital video data.
- [Claim 5] Digital video equipment characterized by blocking a digital video data, carrying out orthogonal transformation of each block, preparing the noise information occurrence section in the compression coding section in the digital video equipment equipped with the compression coding section compressed further, and superimposing a noise information at the time of coding of a digital video data.
- [Claim 6] The compression coding section which blocks a digital video data, carries out orthogonal transformation of each block, and is compressed further, In the digital video equipment equipped with the compression decode section which elongates and carries out reverse orthogonal transformation of the digital video data, and is understood further a blocked part Digital video equipment characterized by preparing the noise information occurrence section in both the compression decode section, or compression coding both [any, one side or], and superimposing a noise information at both both [any, one side, or] of the decode of a digital video data, or coding.
- [Claim 7] the claim 4 characterized by superimposing a noise information on the low frequency component of the frequency-component matrix acquired by orthogonal transformation, or 6 either -- the digital video equipment of a publication
- [Claim 8] the claim 4 characterized by superimposing a noise information on the inside frequency component of the frequency-component matrix acquired by orthogonal transformation, or 6 either -- the digital video equipment of a publication
- [Claim 9] the claim 4 characterized by superimposing a noise information on the high-frequency component of the frequency-component matrix acquired by orthogonal transformation, or 6 either -- the digital video equipment of a publication

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to digital video equipments, such as a digital video disc and digital videotape, especially the digital video equipment which can restrict the number of times of dubbing (copy).

[0002]

[Description of the Prior Art] As everyone knows, even if a wave deteriorates, regeneration and the restoration are easy for the digital signal, and the error correction of compensating the missing pulse with the digital signal encoded further, or removing the pulse mixed by the noise etc. is also possible for it. With the digital video equipment treating the digital video data using such a digital signal, even if it repeats a copy over what generation so that it may say that what was copied is copied further, a signal does not change, that is, since quality of image does not deteriorate, there is a possibility that a lot of unjust duplicate objects may overflow.

[0003] For this reason, the scramble signal which consists of a pseudo-random sign is conventionally superimposed in the digital video data by the side which offers an information. That the content cannot grasp at all but makes the use improper (meaningless even if it copies) with the equipment which is not equipped with the decoder circuit **** (for example, to JP.6-124539,A) the modality of device connected is detected and digital VTR which carries out scramble processing according to the modality is indicated. When the digital copy was performed, as a digital copy could not be carried out twice or more in succession, the copyright was protected by adding the recognition signal which expresses the fact with an equipment side to a digital video data.

[0004]

[Problem(s) to be Solved by the Invention] However, by the technique of superimposing the scramble signal mentioned above, while the big decoder circuit of a scale was needed for the equipment by the side of regeneration for scramble cancel and large-sized-izing of equipment and elevation of a cost were caused, after canceling scramble, there was a problem that it could copy freely. Moreover, also by the technique of enabling a digital copy once, when the recognition signal was removed or the detector was repealed, there was a problem that it could copy freely.

[0005] If it was in the status that it deteriorated in the grade which can grasp the content rather than it makes the copy itself completely impossible, the technique of performing scramble processing which makes a picture image the invisible status completely on the other hand for PR of a work, or the view that it is more desirable to enable a certain amount of number-of-times copy also has, and mentioned above in this case, or enabling a digital copy once was not suitable.

[0006] Like analog video equipment, whenever it copies, a picture image deteriorates, and the purpose of this invention is to offer the digital video equipment which can restrict the number of times of a copy by this.

[0007]

[Means for Solving the Problem] In this invention, in order to attain the aforementioned purpose, the means which embeds the noise information on the grade which is not discriminable by one processing from a record medium in the digital video data read from the record medium in the digital video equipment which reproduces a digital video data at the time of an image reconstruction was established.

[0008] Moreover, by one processing, the means which embeds the noise information on the grade which is not discriminable at the time of an image reconstruction was established into the digital video data which writes a digital video data in a record medium in the digital video equipment recorded on a record medium.

[0009] Moreover, while the digital video data was recorded on the record medium, both both [any, one side, or] which embed the noise information on the grade which is not discriminable from a record medium by one processing at the time of an image reconstruction in the digital video data written in the means or record medium which embeds the noise information on the grade which is not discriminable by one processing in the digital video data read from the record medium in the digital video equipment which reproduces a digital video data at the time of an image reconstruction were established.

[0010] It deteriorates so that a picture image will not bear admiration, if it repeats two or more times, although the copy itself is possible like analog video equipment by embedding the noise information of the grade which is not discriminable to a digital video data by one processing in any at the time of the time of regeneration, or record, one side, or both at the time of an image reconstruction according to this invention, and this can restrict the number of times of a copy substantially.

[0011]

[Embodiments of the Invention] Hereafter, this invention is explained in full detail based on a drawing.

[0012] Drawing 1 shows an example of the gestalt of operation of this invention, and shows signs that an analog copy is performed using the digital video equipment of both by the side of regeneration and record, and these here. That is, among drawing, ten are the digital video equipment by the side of regeneration, and consist of the recovery section 11, the error correction decode section 12, the compression decode section 13, the synchronizing signal addition section 14, and a digital-to-analog transducer (D/A) 15. Moreover, 20 is the digital video equipment by the side of record, and consists of the analog-to-digital-conversion section (A/D) 21, the compression coding section 22, the error correcting code-ized section 23, and the modulation processing section 24.

[0013] During the aforementioned configuration, the compression decode section 13 and the compression coding section 22 are equipped with the noise information occurrence section, and have the function which superimposes the noise information on the grade which is not discriminable at the time of an image reconstruction by one processing in a digital video data. In addition, other configurations are the same as that of the case of the conventional digital video equipment.

[0014] In the digital video equipment 10 by the side of the aforementioned regeneration, serial/parallel conversion is carried out, the error correction decode section 12 is supplied, and, as for the regeneration digital video data reproduced from the record medium and signal regeneration system not to illustrate, data appearance and the data by which error correction was carried out here are supplied to the compression decode section 13 by the recovery section 11. In the compression decode section 13, while the compression of data by which error correction was carried out is solved, a noise information is multiplexed. Thus, decode is carried out, a synchronizing signal is added in the synchronizing signal addition section 14, and D/A conversion of the video data superimposed on the noise information is carried out in the D/A-conversion section 15, and it is taken out as an analog video signal where the noise was embedded.

[0015] Moreover, although A/D conversion of the analog video signal mentioned above is inputted and carried out to the A/D-conversion section 21 of the digital video equipment 20 by the side of record and it serves as a digital video data, since the noise is embedded, many quantization errors will come out rather than usual. This digital video data is supplied to the compression coding section 22, and a noise information is multiplexed while it is compressed here. Thus, it is compressed, and the data with which it was superimposed on the noise information are error-correcting-code-ized in the error correcting code-ized section 23, and are outputted to the signal recording system and record medium which serve as the digital video data for record, and are not further illustrated in response to record modulation processing of parallel/serial conversion etc. in the record modulation processing section 24.

[0016] Thus, by one processing, in case a digital video data is reproduced, and in case it records as a digital video data, although the copy itself is possible by superimposing the noise information on the grade which is not discriminable at the time of an image reconstruction, since a picture image deteriorates so that a noise information increases whenever it repeats a copy, and admiration is not borne soon, the number of times of a copy can be restricted substantially.

[0017] Although the above explanation is in the case of an analog copy, since [digital] the noise information mentioned above is superimposed in a digital-signal-processing process, it cannot be overemphasized by that it is useful also in a digital copy which inputs the output of the synchronizing signal addition section 14 into the compression coding section 22. In addition, the configuration of usual digital video equipment in which record and regeneration are possible becomes what combined the configuration of the digital video equipment by the side of the record mentioned above and regeneration (the signal recording system and reversion system to a record medium are included.).

[0018] Moreover, although the example which embeds a noise information by both by the side of record and regeneration was explained, the same effect is acquired although a noise information is embedded by any of record or regeneration, or one side. Therefore, it is useful even if it applies to regeneration special-purpose machineries, such as a digital video disc.

[0019] Drawing 2 shows the concrete configuration of the compression decode section 13 which multiplexes the noise information mentioned above, and, for the reverse variable length decode section and 132, as for the reverse DCT (discrete cosine transform) section and 134, the reverse quantization section and 133 are [131 / the block configuration section and 135] the noise information occurrence sections among drawing.

[0020] The reverse variable length decode (extension) of the data by which error correction was carried out in the error correction decode section 12 is carried out in the reverse variable length decode section 131, and they are reverse-quantized in the reverse quantization section 132. The noise information occurrence section 135 is connected to this reverse quantization section 132 or the reverse variable length decode section 131, in case [which is reverse-quantized by the suitable quantization coefficient] the reverse variable length decode in the case is carried out, the value of DCT (discrete cosine transform) coefficient is changed, and a noise information is multiplexed to a video data. A quantization coefficient may be made to be rewritten based on the quantization data in an input signal, as long as it sets it as a general-purpose value at first, it rewrites in the inputted video data and there is a control signal. And the data with which this noise was embedded are changed in the reverse DCT section 133, and turn into the data of 8x8 units, and a ***** ring, a data interpolation, etc. are performed in the block configuration section 134.

[0021] Drawing 3 shows the concrete configuration of the compression coding section 22 which multiplexes a noise information, and, for the block split section and 222, as for the quantization section and 224, DCT transducer and 223 are [221 / the variable-length-coding section and 225] the noise information occurrence sections among drawing (in addition, flowing of the signal in this view is contrary to the case of drawing 1.).

[0022] The video data by which A/D conversion was carried out in the A/D-conversion section 21 is divided into a 8x8-pixel block in the block split section 221, and DCT conversion is carried out for every block by the DCT transducer 222. the video data by which DCT conversion was carried out is quantized in the quantization section 223 -- having -- the variable-length-coding section 224 -- variable length coding -- for example, it is Huffman-coding-ized The noise information occurrence section 225 is connected to this quantization section 223 or the variable-length-coding section 224, in case it quantizes, or in case variable length coding is carried out, the value of specific DCT coefficient is changed and a noise information is multiplexed to a video data.

[0023] It is a design-matter for the amount and which DCT coefficient of a noise information in the case of noise embedding [which was described above] a noise is embedded, and the picture image of encaustic entering of the shape of a light-and-darkness circular slit can be degraded, maintaining the configuration of a picture image, when the low-frequency component of DCT coefficient (frequency-component matrix acquired by orthogonal transformation) is chosen and a noise is embedded. moreover, the picture image in which the configuration of a picture image itself collapsed when a noise was embedded for the inside cycle component of DCT coefficient -- a degradation -- now, it can go Further again, when a noise is embedded at the high frequency component of DCT coefficient, the picture image on which white noise rode can be degraded.

[0024]

[Effect of the Invention] As explained above, although the copy itself is possible like analog video equipment by embedding the noise information on the grade which is not discriminable by one processing to a digital video data at the time of an image reconstruction [at both both / any, one side, or / of regeneration or record] according to this invention If a multiple-times copy is repeated, the digital video equipment which deteriorates remarkably can be offered, and by this, a picture image will prevent the copy covering many times, and will enable protection of a copyright.

[Translation done.]